State of California
AIR RESOURCES BOARD

Executive Order G-70-175

Certification of the
Hasstech VCP-3A Vacuum Assist Phase II Vapor
Recovery System for Aboveground Tank Systems

WHEREAS, the California Air Resources Board ("the Board" or "CARB") has established, pursuant to California Health and Safety Code Sections 39600, 39601 and 41954, certification procedures for systems designed for the control of gasoline vapor emissions during motor vehicle fueling operations (Phase II vapor recovery systems) in its "Certification Procedures for Gasoline Vapor Recovery Systems at Service Stations" (the "Certification Procedures") as last amended December 4, 1981, incorporated by reference into Title 17, California Code of Regulations, Section 94001;

WHEREAS, the Board has established, pursuant to California Health and Safety Code Sections 39600, 39601 and 41954, test procedures for determining the compliance of Phase II vapor recovery systems with emission standards in its "Test Procedures for Determining the Efficiency of Gasoline Vapor Recovery Systems at Service Stations" (the "Test Procedures") as last amended September 1, 1982, incorporated by reference into Title 17, California Code of Regulations, Section 94000;

WHEREAS, the VCP-3A system has been certified for underground tank systems by Executive Order G-70-164 dated April 11, 1995 and may be used with the three types of bootless nozzles listed in Exhibit 1 of this Order;

WHEREAS, Eric Hasselmann of Hasstech, Inc., ("Hasstech") has requested certification of the Hasstech VCP-3A bootless nozzle vapor recovery system (the "VCP-3A system") for aboveground tank systems pursuant to the Certification Procedures and Test Procedures;

WHEREAS, the VCP-3A system has been evaluated for use on aboveground tank systems pursuant to the Board's Certification Procedures;

WHEREAS, Section VIII-A of the Certification Procedures provides that the Executive Officer shall issue an order of certification if he or she determines that the vapor recovery system conforms to all of the requirements set forth in Sections I through Vll of the Certification Procedures; and

WHEREAS, I, James D. Boyd, Air Resources Board Executive Officer, find that the Hasstech VCP-3A bootless nozzle aboveground storage tank vapor recovery system conforms with all the requirements set forth in Sections I through VII of the Certification Procedures and results in a vapor recovery system which is at least 95 percent efficient in attended and or self-serve use at gasoline dispensing facilities when used in conjunction with a Phase I system which has been certified by the Board and meets the requirements contained in Exhibit 2 of this order;

NOW, THEREFORE, IT IS HEREBY ORDERED that the Hasstech VCP-3A system when used with a CARB-certified Phase I system, as specified in Exhibits 1 and 2 of this Order, is certified

to be at least 95 percent effective in attended and/or self-serve mode. Fugitive emissions which may occur when the aboveground storage tanks are under positive pressure have not been quantified and were not included in the calculation of system effectiveness. Exhibit 1 contains a list of the equipment certified for use with the Hasstech VCP-3A system. Exhibit 2 contains installation and performance specifications for the system. Exhibit 3 contains a static pressure decay test procedure.

IT IS FURTHER ORDERED that the dispensing rate for installations of the VCP-3A system shall not exceed ten (10.0) gallons per minute when only one nozzle associated with the product supply pump is operating. This is consistent with the flowrate limitation imposed by United States Environmental Protection Agency as specified in the Federal Register, Volume 58, Number 55, page 16019.

IT IS FURTHER ORDERED that compliance with the certification requirements and rules and regulations of the Division of Measurement Standards of the Department of Food and Agriculture, the State Fire Marshal's Office, and the Division of Occupational Safety and Health of the Department of Industrial Relations is made a condition of this certification.

IT IS FURTHER ORDERED that the following requirements are made a condition of certification. The VCP-3A system shall be installed only in facilities which are capable of demonstrating on-going compliance with the vapor integrity requirements contained in Exhibit 3 of this Order. The owner or operator of the installation shall conduct, and pass, a static pressure decay test at least once in each twelve month period, and the results shall be made available to the district upon request within fifteen days after the test is conducted, or within fifteen days of the request. Alternative test procedures may be used if determined by the Executive Officer to yield comparable results.

IT IS FURTHER ORDERED that the certified VCP-3A system shall, at a minimum, be operated in accordance with the manufacturer's recommended maintenance intervals and shall use the manufacturer's recommended operation, installation, and maintenance procedures.

IT IS FURTHER ORDERED that the VCP-3A system, as installed, shall comply with the procedures and performance standards the test installation was required to meet during certification testing. Local districts may adopt stricter procedures or performance standards in accordance with the California Health and Safety Code section 41954(g). Failure to demonstrate compliance with procedures or performance standards stricter than those imposed during certification testing does not constitute failure of the VCP-3A system to meet the terms and conditions of this Executive Order. If, in the judgment of the Executive Officer, a significant fraction of installations fail to meet the specifications of this certification, or if a significant portion of the vehicle population is found to have configurations which significantly impair the system's collection efficiency, the certification itself may be subject to modification, suspension or revocation.

IT IS FURTHER ORDERED that all nozzles approved for use with the Hasstech VCP-3A system shall be 100 percent performance checked at the factory, including checks of the integrity of the vapor and liquid path, as specified in Exhibit 2 of this Order, and of the proper functioning of all automatic shut-off mechanisms.

IT IS FURTHER ORDERED that each vapor pump shall be adjusted and 100 percent performance checked at the factory, including verification that the vapor recovery system performance is within the range specified in Exhibit 2 of this Order.

IT IS FURTHER ORDERED that the certified VCP-3A system shall be warranted in writing, for at least one year, to the ultimate purchaser and each subsequent purchaser, that the vapor recovery system is designed, built and equipped so as to conform at the time of original installation or sale with the applicable regulations and is free from defects in materials and workmanship which would cause the vapor recovery system to fail to conform with applicable regulations. Copies of the manufacturer's warranty for the VCP-3A system shall be made available to the station manager, owner or operator. Hoses, nozzles and breakaway couplings shall be warranted to the ultimate purchaser as specified above for at least one year, or for the expected useful life, whichever is longer.

IT IS FURTHER ORDERED that the certified VCP-3A system shall be performance tested during installation for ability to dispense gasoline and collect vapors without difficulty, in the presence of the station manager or other responsible individual. The station manager, owner or operator shall also be provided with instructions in the proper use of the VCP-3A system, its repair and maintenance, where system and/or component replacements can be readily obtained, and shall be provided with copies of the installation and maintenance manuals for the VCP-3A system to be maintained at the station. Revisions to the manual shall be submitted to CARB for approval.

IT IS FURTHER ORDERED that any alteration of the equipment, parts, design, or operation of the- systems certified hereby is prohibited, and deemed inconsistent with this certification, unless such alteration has been approved by the Executive Officer or his/her designee.

Executed at Sacramento, California, this 18TH day of April 1996.

James D. Boyd
Executive Officer

Attachments

Executive Order G-70-175

Exhibit I

Hasstech VCP-3A System Equipment List

Component	Manufacturer/Model	State Fire Marshal Identification Number
Nozzles (Figure 2C)	OPW 11VAI-XX Without vapor valve where XX = 22 (leaded, hold-open clip) 27 (unleaded, hold-open clip) 42 (leaded, no hold-open clip) 47 (unleaded, no hold-open clip)	05:001:001
	Emco Wheaton A4500-002 Without vapor valve	005:007:042
	Husky V34 6200-8 With vapor valve *OR* Any bootless nozzle which has been CARB certified for use with the VCP-3A system.	005:008:049
Vapor Pump (Collection Unit)	Rotron Regenerative Blower (1/2 hp.) Model Number DR 313 AK4HA (Figure 2B-2)	1016-7
Inverted Coaxial Hoses.	Catlow VaporMate Dayco 7282 Superflex 2000 Dayco 7292 Superflex 4000 Goodyear Flexsteel GT Sales/Hewitt Superflex 2000 Thermoid Hi-Vac Thermoid Hi-Vac S VST VSTalflex	005:033:005 005:033:005 005:033:006 005:036:002 005:033:005 005:037:003 005:037:004 005:052:001
	OR Any inverted coaxial hose CARB certified for use with the Hasstech VCP-3A system.	
Flow Actuated Vapor Valve	CFC-1 coaxial flow actuated vapor valve	005:001:002
Flame Arrestors		
Dispenser	Hasstech 1025-3/4"	1016-5
Pump Inlet	Protectoseal SP 4951 (1 -1/4")	1016-6
Pump Outlet	Protectoseal SP 4951 (1-1/4")	1016-8
OR substitute	Hasstech 1025 - (1-1/4")	016-6 and -8
Processor Unit	Hasstech 1016-PR-A (Figure 2B-1) with serial numbers greater than PR-00908	1016-PRA

Process Control Panel	Hasstech Electronic Control and Status Panel ECS-1 with Audible Alarm and Serial Numbers VR-00848 and higher (Figure 2B-3)	005:001:003
Pressure/Vacuum Valves	OPW 523LP, 523LPS (settings as specified below)	005:008:051
	Hazlett H-PVB-1 Gold label (settings as specified below)	005:017:004
	Varec Model Number 2010-811 -2	1016-9
	OR Any CARB-certified valve with the following pressure and vacuum settings, in inches water column (wc):	
	Pressure: three plus or minus one-half inches (3.0± 0.5") wc.	
	Vacuum: eight plus or minus two inches (8 ± 2") wc.	
Tank Pressure Switch	Part Number PST-1 (Figure 2B-4)	
Breakaway Couplings (optional component)	**Couplings with vapor valves:**	
	Catlow AV2001 or OPW 66CIP	005:031:006
	Richards Industries VA-60	005:031:009
	Richards Industries VA-50	005:031:007
	Husky 4034	005:021:009
	Couplings without a vapor valves: (To be used only with a remote vapor valve i.e., a CFC-1 Flow Control Valve)	
	Catlow AV200	005:030:005
	Catlow AV200-1	005:030:005
	OPW 66CI	005:030:005
	Richards Industries VA-51 005:031:007	
	OR Any breakaway coupling has been CARB certified for use with the VCP-3A system	
Vapor Plumbing Components (optional components)		
In-tank drain check	Hasstech 1044	1016-31
Out-of-tank drain check	Hasstech 1042	1016-32
Tank Stick Correction Gauge (optional component)	Hasstech TSC	

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Exhibit 2

Specifications for the Hasstech VCP-3A System

Typical installations of the Hasstech system are shown in Figures 2A-1 through 2A-5.

Nozzles

1. Failure mode testing has demonstrated that blockage of some of the vapor collection holes in the spout has negligible effect on the operation of the system. Any nozzle which has fewer unblocked holes than are required below is defective and shall be immediately removed from service.

Nozzle Type	Total Number of Holes per Nozzle	Minimum Number of *Unblocked* Vapor Holes Required
Emco Wheaton A4500	7	3
Husky V34 6200-	8 (6 in circle around spout, plus 1 higher, and 1 for shutoff aspirator)	1 (must be among the 6)
OPW 11VAI	18 (steel spout) 12 (aluminum spout)	was not determined was not determined

2. An Emco Wheaton A4500 nozzle (Figure 2C) which has any visible puncture or tear of the vapor guard/vapor seal assembly is defective and shall be immediately removed from service.

3. A leaking vapor valve, whether in the nozzle or remotely located, may comprise the vapor recovery capabilities of the entire system; therefore, it is imperative that defective vapor valves be corrected expeditiously in order to minimize emissions.

   The Husky V34 6200-8 nozzle (Figure 2C) has an integral vapor valve which prevents the loss of vapor from the aboveground storage tanks, ensures proper operation of the system and prevents the ingestion of air into the system. Any nozzle with a defective vapor valve shall be immediately removed from service. The integrity of the system shall be restored by replacing the nozzle or otherwise closing the vapor path as soon as practicable.

   The OPW 11VAI nozzle (Figure 2C) and the Emco Wheaton A4500-002 nozzles do not have an integral vapor valve. These nozzles shall be installed with a certified remote vapor valve (i.e., CFC-1 flow control vapor valve) as specified in Exhibit 1 of this Order. Any nozzle associated with a defective remote vapor valve shall be immediately removed from service. The integrity of the system shall be restored by replacing the remote vapor valve or otherwise closing the vapor path as soon as practicable.

4. Nozzles shall be 100 percent performance checked at the factory, including checks of all shutoff mechanisms and of the integrity of the vapor path. The maximum allowable leak rate for nozzles with internal vapor valves during this factory performance test shall not exceed the following:

   0.038 CFH at a pressure of at least two (2) inches water column
   0.005 CFH at a vacuum of at least forty (40) inches water column.

5. Leaded and unleaded spouts are interchangeable.

Flow Actuated Vapor Valves

A flow actuated vapor valve, as listed in Exhibit 1, shall be installed in conjunction with each nozzle which does not have an integral vapor valve. Vapor valves shall be 100 percent performance checked at the factory. The maximum allowable leak rate for vapor valves during this factory performance test shall not exceed the following:

0.038 CFH at a pressure of at least two (2) inches water column
0.005 CFH at a vacuum of at least forty (40) inches water column.

Breakaway Couplings

Breakaway couplings are optional. If they are installed, only certified breakaways with a valve which closes the vapor path when separated shall be used for nozzles with internal vapor valves. Note: a breakaway with a vapor valve that closes upon separation is not required if the CFC-1 flow control valve (or any other remote vapor valve CARB certified with the VCP-3A system) is used because the vapor path remains closed unless there is gasoline flow.

Inverted Coaxial Hoses

1. The maximum length of the hose shall be 14 feet.

2. The length of hose which may be in contact with the island and/or ground when the nozzle is properly mounted on the dispenser is limited to six (6) inches.

Collection Unit (Vapor Pump)

1. The VCP-3A system shall operate with a certified collection unit (pump) specified in Exhibit 1 capable of meeting the air to liquid (A/L) ratio specified below. The A/L ratio of the system, measured at a flowrate of at least six gallons per minute (6 gpm), shall be within the values listed in the following table (linear interpolation may be used to calculate intermediate values). Any fueling point not capable of demonstrating compliance with this performance standard shall be deemed defective and removed from service. The A/L ratio shall be determined by a CARB-approved or district-approved test procedure (Draft procedure TP-201.5 may be used until an A/L ratio test procedure is adopted by CARB). Alternative test procedures may be used if they are determined by the Executive Officer to yield comparable results.

Air to Liquid Ratios

Flow Rate (gpm)	Minimum Ratio	Maximum Ratio
6	1.40	2.40
8	1.40	2.30
10	1.40	2.15

NOTES:

a. The Husky V34 6200-8 nozzle requires a special A/L adapter that will encompass all of the vapor recovery holes; however, test results have indicated that a special A/L adapter is not necessary if the single top hole is covered for the A/L test (refer to Figure 2C).

b. This test procedure returns air rather than vapor to the storage tank, and may cause an increase in storage tank pressure and/or affect process unit operation. Temporary conditions which are attributable to the test are not to be considered an indication of malfunction or noncompliance.

2. No dispensing shall be allowed when the collection unit is disabled for maintenance or for any other reason unless the facility is operating under a district variance or upset/breakdown rule provision.

3. The maximum number of fueling points which can be supported by one collection unit is sixteen (16). This is based on an in-use factor of fifty percent (50% and a demonstration of eight nozzles dispensing 7.5 gallons simultaneously with an A/L ratio greater than 1.4. Additional fueling points require an additional collection unit (one per sixteen additional fueling points).

4. OSHA-approvable access to the collection unit shall be provided immediately upon request for maintenance, inspection and/or testing.

5. The local district may require the installation of a tap at least 1/8" NPT be provided on the inlet and outlet side of the collection unit. The taps shall remain plugged and vapor tight except when test equipment is being connected or removed. Air ingestion and/or vapor loss associated with connecting or removing test equipment shall be minimized. The vacuum level at the inlet of the collection unit can be adjusted by changing the size of the by-pass orifice. The normal operating level at this point shall be minus 30 to 40 inches water column.

   Note: Changing the length of the hoses or the number of installed nozzles may affect the vacuum level and require adjustment of the by-pass orifice.

Processing Unit (burner)

1. The Hasstech VCP-3A Processing Unit consists of an in line flame arrestor, an in-line pressure switch, a solenoid activated vapor valve, another flame arrestor, and a single stage burner assembly with electronic ignition and a flame detector (refer to Figure 2B-1).

2. At no time shall emissions from the processing unit exceed Ringelmann one-half ($^1/_2$) or ten percent (10%) opacity. Note: visible emissions, except water vapor or heat waves, may indicate improper burner operation unless associated with a Phase I fuel delivery.

3. The horizontal distance between the pressure/vacuum valve and the processing unit shall be not less than twenty (20) feet. The processing unit shall be installed in accordance with the manufacturer's installation manual.

4. Twenty (20) consecutive unsuccessful attempts to ignite the process unit shall cause the process unit to lock out and the alarm to be activated. This condition would most likely represent a broken flame sensor or a defective ignitor. When this condition has occurred, it shall be deemed a failure of the process unit.

5. Twenty (20) non-consecutive unsuccessful attempts to ignite the process unit shall cause the alarm shall be activated but shall allow the process unit to continue to operate. The reason to allow the process unit to operate is that the failed ignition attempts may not represent a defective process unit. The alarm is activated so that the station operator is alerted to have the unit checked out for a possible problem.

6. No dispensing shall be allowed when the process unit is disabled for maintenance or for any other reason unless the facility is operating under a district variance or upset/breakdown rule provision.

7. OSHA-approvable access to the process unit shall be provided immediately upon request for maintenance, inspection and/or testing.

8. The location of the process unit shall be subject to the approval of the local fire authority.

ECS-1 Electronic Control and Status Panel

1. The VCP-3A system shall have an operable ECS-1 control and status panel (refer to Figure 2B-3). The ECS-1 status panel shall have clearly labeled indicators, which light to indicate when the collection unit and process unit are operating. The VCP-3A system may be differentiated from previous versions of the VCP-2A by the ECS-1 control and status panel serial numbers greater than VR-00848 and process unit serial numbers greater than PR00908. No other versions of these components shall be used with the VCP-3A system. Note: This status panel has "YES", "NO" and "Reset" buttons. Previous versions of the status panel, not for use with the VCP-3A system, do not have the "Reset" button:

2. The status panel shall record and store for 365 days the total number of minutes per day that the Process Unit ("PR") senses the presence of a flame and the total number of minutes per day that the solenoid valve to the burner ("SO") is open. This shall be determined on the basis of data points taken at least every 0.5 seconds. This information shall be accessible by pressing the "YES" button on the status panel. The ratio of PR/SO time which indicates that the system is operating properly shall be not less than 0.90.

3. Each ECS-1 electronic and control status panel shall have instructions readily available to station personnel on how to operate the panel. These instructions shall include the service code numbers for the alarm mode and the normal mode (alarm light emitting diode not lit).

4. The ECS-1 panel shall display "CALL FOR SERVICE" when the number of unsuccessful attempts to ignite the burner in a twenty-four hour period reaches twenty.

5. The status panel shall also indicate the system status, either by displaying "SYSTEM NORMAL" (indicating that the FLAME/VALVE ratio is in the normal operating range as specified above) or by displaying the message "CALL FOR SERVICE".

Audible Alarm

1. The VCP-3A system shall include an audible alarm which shall sound if any of the following conditions have occurred:

   a. The gasoline dispenser has been activated for two seconds without causing activation of the collection unit;

   b. the processing unit has made twenty (20) consecutive unsuccessful attempts to ignite; or

   c. the processing unit has made twenty (20) non-consecutive unsuccessful attempts to ignite in a 24 hour period.

   If the alarm sounds, the manual reset shall be used to restart the system. If the alarm sounds again within several hours, the unit is presumed to be malfunctioning and a call for service shall be made.

2. The audible alarm shall be located such that it can easily be heard by station personnel in the area most likely to be occupied during normal station operation (i.e., at the cash register.)

Tank Pressure Switch

The VCP-3A system contains two pressure switches designed to activate the system. The in-line pressure switch, located in the processing unit, shall be set to activate at a nominal inlet pressure of 1 inch water column. The second pressure switch (Part Number PST-1) shall be installed on the tank outlet of the collection unit. The purpose of the tank pressure switch is to monitor the storage tank pressure and to activate the system if the tank pressure exceeds plus 1.0 inches of water column. During

normal operations, the VCP-3A system maintains storage tank pressures in the range of minus 0.5 to plus 1.0 inches of water column. This range is occasionally exceeded briefly due to peak activity periods or bulk fuel delivery operations. Pressures which are consistently outside of this range may indicate system malfunction.

Pressure/Vacuum Valves for Storage Tanks

1. Pressure/vacuum (P/V) relief valves shall be installed as required by Title 8, California Code of Regulations (General Industry Safety Orders).

Vapor Recovery Piping Configurations

1. All vapor return lines shall slope a minimum of 1/8 inch per foot. A slope of 1/4 inch or more per foot is recommended wherever feasible.

2. The dispenser shall be connected to the riser with either flexible or rigid material which is listed for use with gasoline. The dispenser-to-riser connection shall be installed so that any liquid in the lines will drain toward the condensate collection pipe "pot" or drop out tank. The internal diameter of the connector, including all fittings, shall not be less than five-eighths inch (5/8").

3. The nominal inside diameter of the belowground and aboveground vapor lines shall be two inches (2"). All vapor lines shall allow unobstructed passage of vapor as appropriate in normal operation of the system. The vapor return lines shall be installed as shown in Figures 2A-1, 2A-2 and 2A-3.

4. All vapor return and vent piping shall be, at a minimum, installed in accordance with the manufacturer's instructions and all applicable regulations. Local districts may impose additional requirements.

Condensate Trap Piping Configuration

The vapor piping shall have a natural drainage of condensate to a drop out tank or pipe pot to ensure that the intended path of vapors is not subjected to liquid blockage as shown in Figures 2A-1, 2A-2 and 2A-3. The drain check as shown in Figures 2A-2 and 2A-3 is designed to be normally flooded with product (Figure 2A-5). The District may require the use of a pipe pot condensate trap which is self-evacuating (as shown in Exhibit 2A-6), vapor tight and accessible for inspection. If a district elects to allow a condensate trap which is not self evacuating, the district may require the station operator to maintain a log documenting regular evacuation of the condensate trap to ensure that these devices do not block the vapor path. Note: Local districts may require the introduction of liquid into vapor lines before conducting air to liquid ratio tests to verify natural drainage.

Storage Tank and Phase I System

WARNING: Phase I fill caps should be opened with caution because the storage tank may be under pressure.

1. The local district may require the installation of a threaded tap at least 1/8" in diameter at which the aboveground storage tank (AGT) pressure may be monitored. The tap may be in the dispenser riser connection or on the vent valve, and shall be accessible for connection to a pressure gauge. One tap is adequate for manifolded systems. The tap shall remain plugged and vapor tight except when test equipment is being connected to or removed from it. The system shall not be allowed to operate when the taps are not vapor tight. If located on the vent line, the tap shall be a least six feet (6') and not more than eight feet (8') above grade. A high quality quick-disconnect fitting with a vapor tight cap may be installed instead of a plug if specified by the district.

Note: Frequent venting (except when caused by air ingested into the system during the performance of the A/L ratio test, Phase I activities, or other events not specifically caused by the Phase II system) may indicate system malfunction.

2. The Phase I system shall be a CARB-certified system which is in good working order and which demonstrates compliance with the static pressure decay test criteria contained in Exhibit 3 of this Order.

3. The Phase I vapor recovery system shall be operated during product deliveries so as to minimize the loss of vapors from the facility storage tank which may be under pressure. There shall be no less than one vapor return hose connected for each product being delivered. Provided it is not in conflict with established safety procedures, this may be accomplished in the following manner:

   a. The Phase I vapor return hose is connected to the delivery tank and to the tank vapor recovery adapter prior to opening the vapor path to the storage tank;

   b. The delivery tank is opened only after all vapor connections have been made and is closed before disconnecting any vapor return hoses;

   c. The existing Phase I equipment is in good working order and has demonstrated compliance with static pressure decay test criteria; and

   d. The vapor return hose is disconnected from the facility storage tank before it is disconnected from the delivery tank.

4. Storage tanks and piping shall be maintained white, silver or beige. Colors which will similarly prevent heating of the system due to solar gain may also be used, provided they are listed in the EPA AP-42 publication as having a factor the same as or better than that of the colors listed above.

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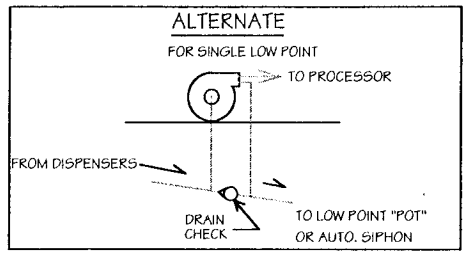
Figure 2A-1
Aboveground Tank V/R Installation (Typical)

NOTES:

1. VAPOR COLLECTION UNIT DRAWS VAPORS FROM THE ISLANDS AND PUSHES THEM INTO THE TANKS.
2. VAPOR PROCESSOR FLARES EXCESS VAPOR. THUS KEEPING STORAGE TANK PRESSURE BELOW THE RELIEF SETTING OF THE PRESSURE/VACUUM VALVE.
3. 30" LOOP IN PIPE PREVENTS PRODUCT BACK-FLOW IN EVENT OF STORAGE TANK OVERFILL.
4. GAUGE GIVES CONTINUOUS INDICATION OF SYSTEM PRESSURE STATUS. (OPTIONAL)
5. "POT" IS AN ACCESSIBLE CLEANOUT FOR CONDENSATE AT EACH LOW POINT.
6. 50 FOOT MINIMUM FROM CONTAINMENT STRUCTURE FOR LESSER DISTANCES SEE SECT. 1918.63 CALIF. STATE FIRE MARSHAL REGULATIONS.
7. EMERGENCY VENTS TO BE VAPOR TIGHT AND MEET REQUIREMENTS OF NFPA-30(1984). APPENDIX A.
8. SYSTEM TO BE INSTALLED AND USED IN CONFORMANCE WITH TITLE 8 (CAL OSHA) REGULATIONS



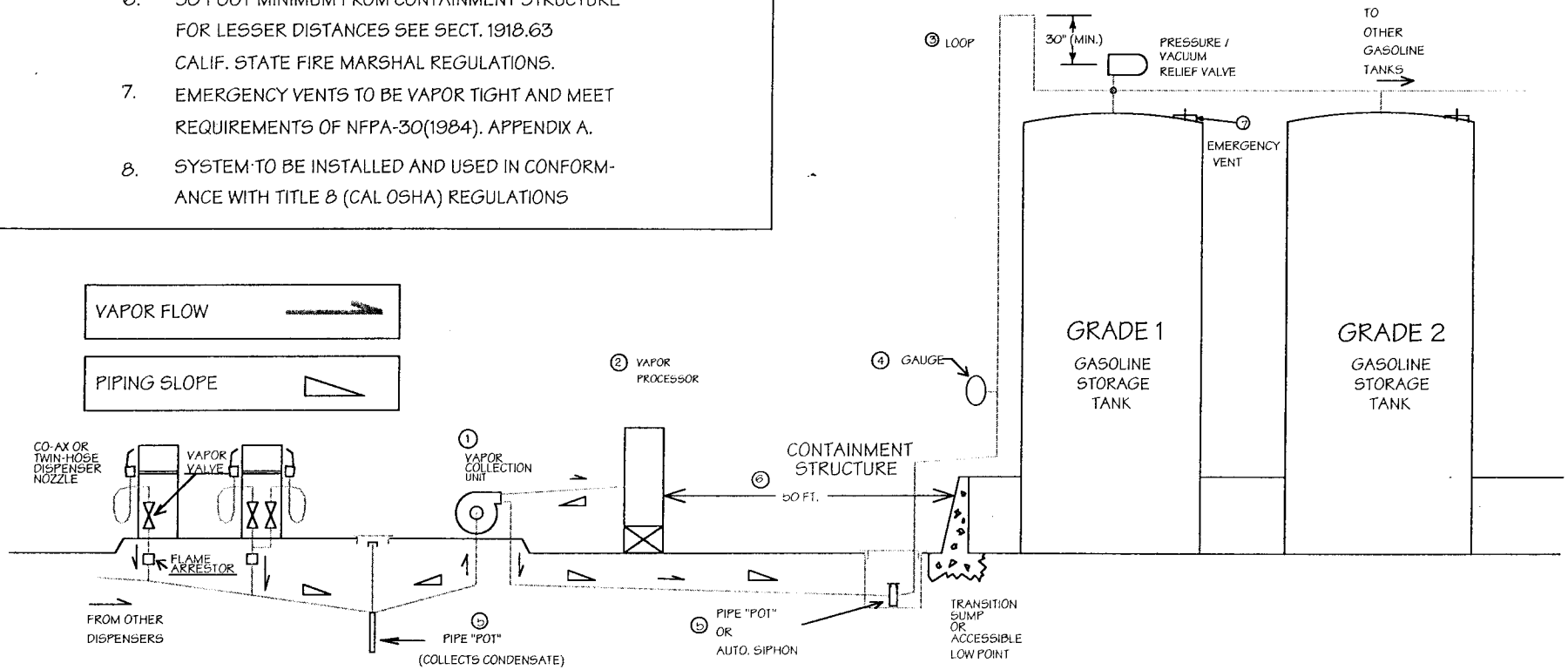


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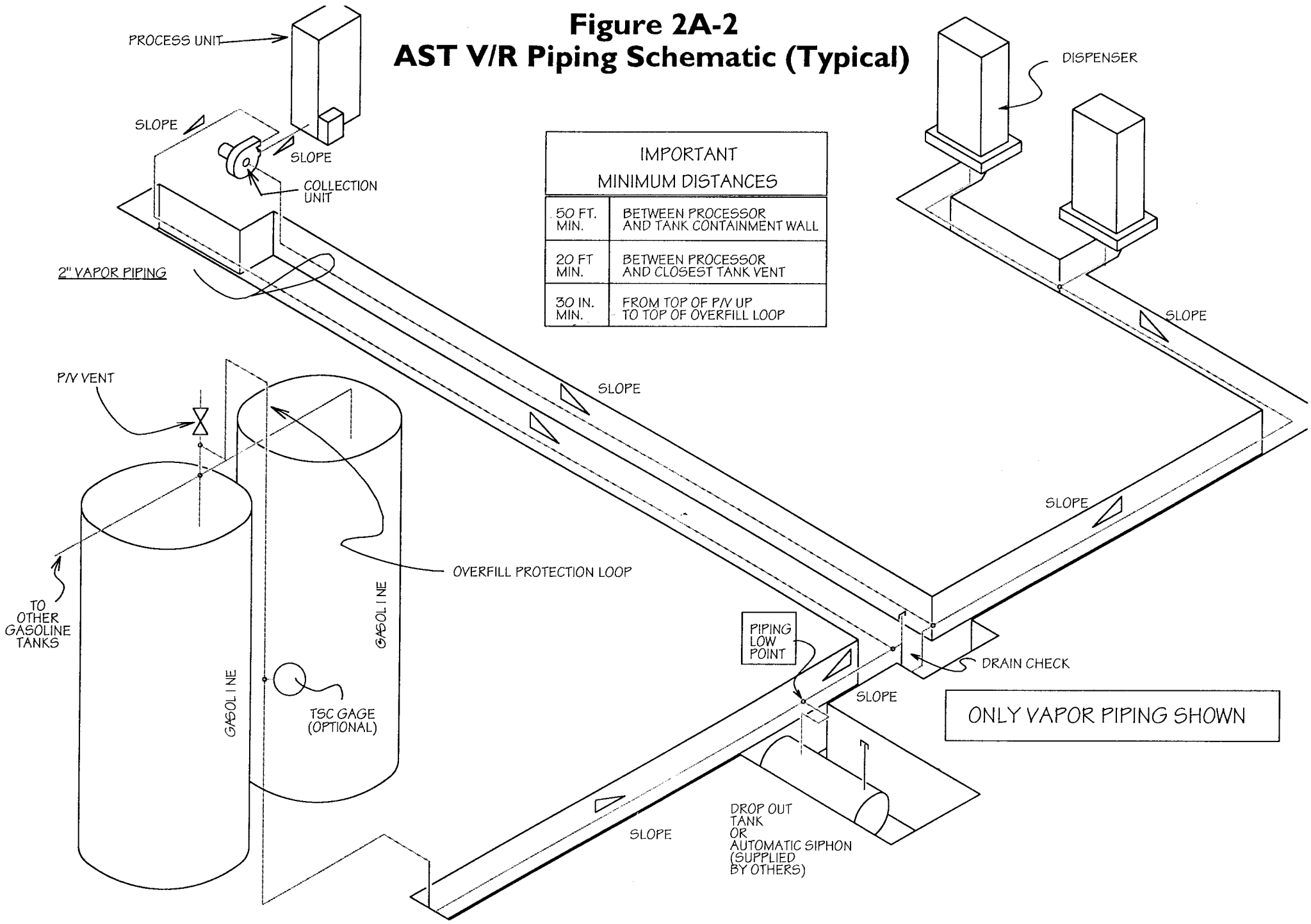
Figure 2A-2
AST V/R Piping Schematic (Typical)



IMPORTANT MINIMUM DISTANCES	
50 FT. MIN.	BETWEEN PROCESSOR AND TANK CONTAINMENT WALL
20 FT MIN.	BETWEEN PROCESSOR AND CLOSEST TANK VENT
30 IN. MIN.	FROM TOP OF P/V UP TO TOP OF OVERFILL LOOP

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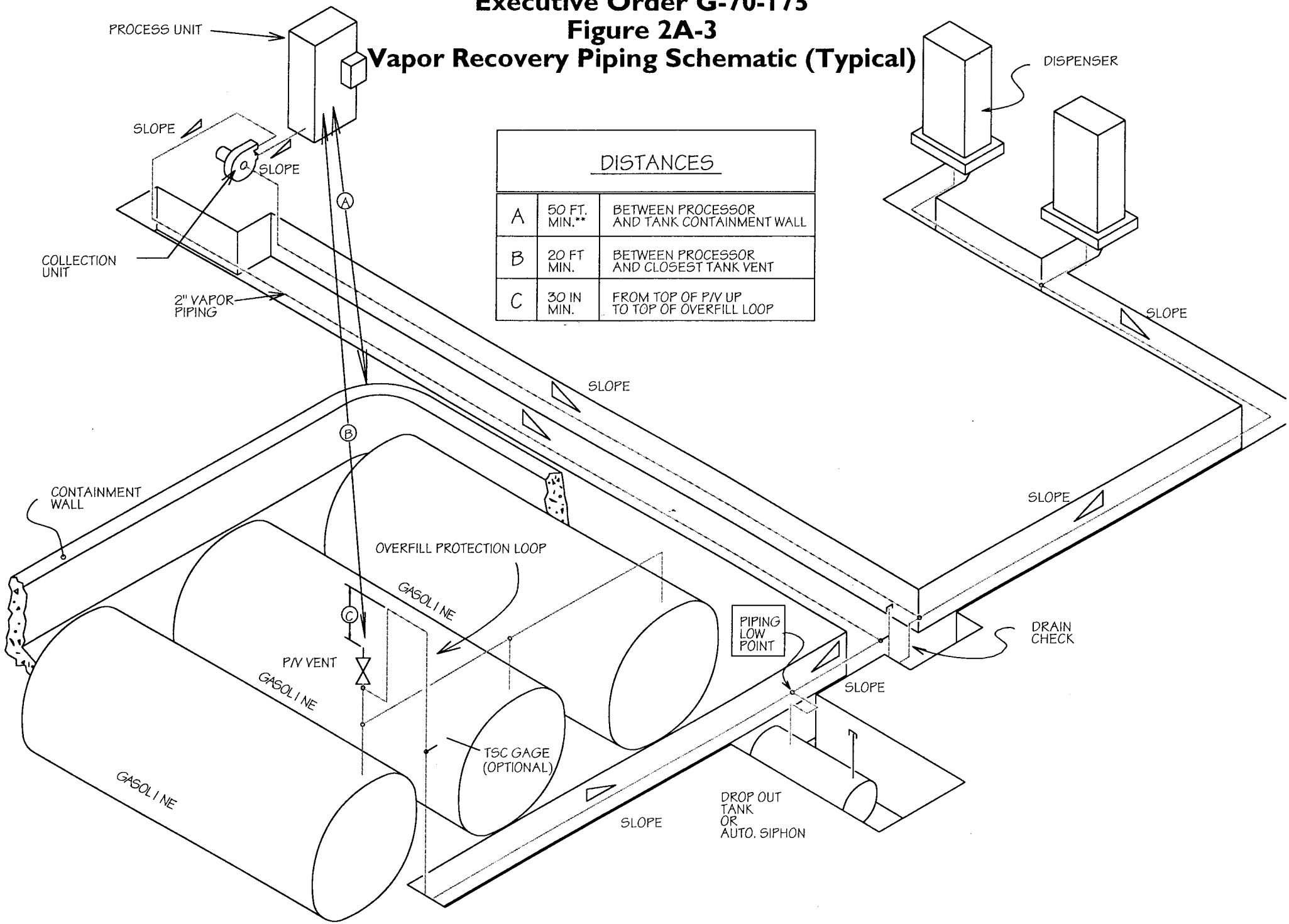
Figure 2A-3
Vapor Recovery Piping Schematic (Typical)



DISTANCES		
A	50 FT. MIN.**	BETWEEN PROCESSOR AND TANK CONTAINMENT WALL
B	20 FT MIN.	BETWEEN PROCESSOR AND CLOSEST TANK VENT
C	30 IN MIN.	FROM TOP OF P/V UP TO TOP OF OVERFILL LOOP

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Figure 2A-4
Out of Tank Drain Check

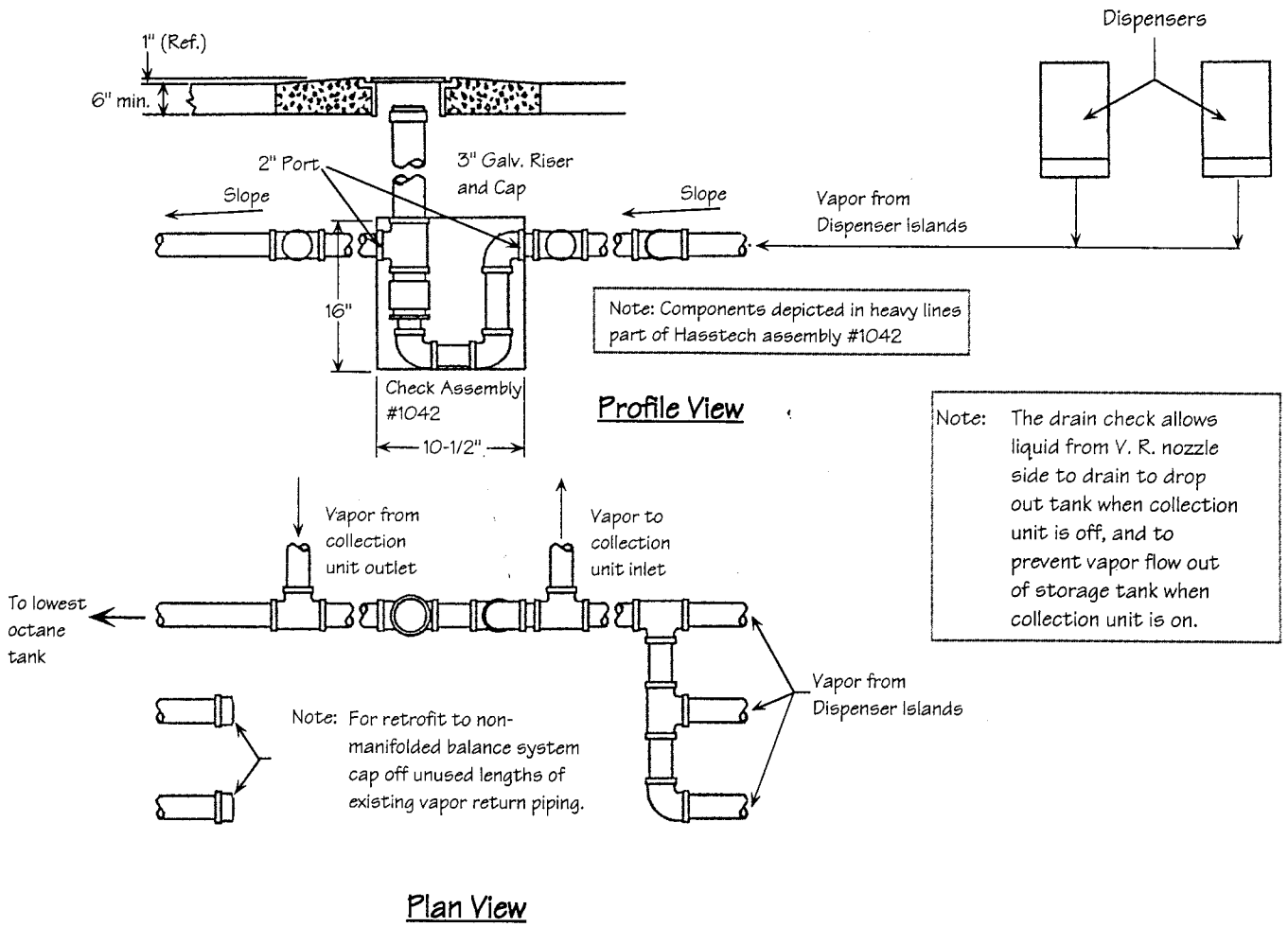

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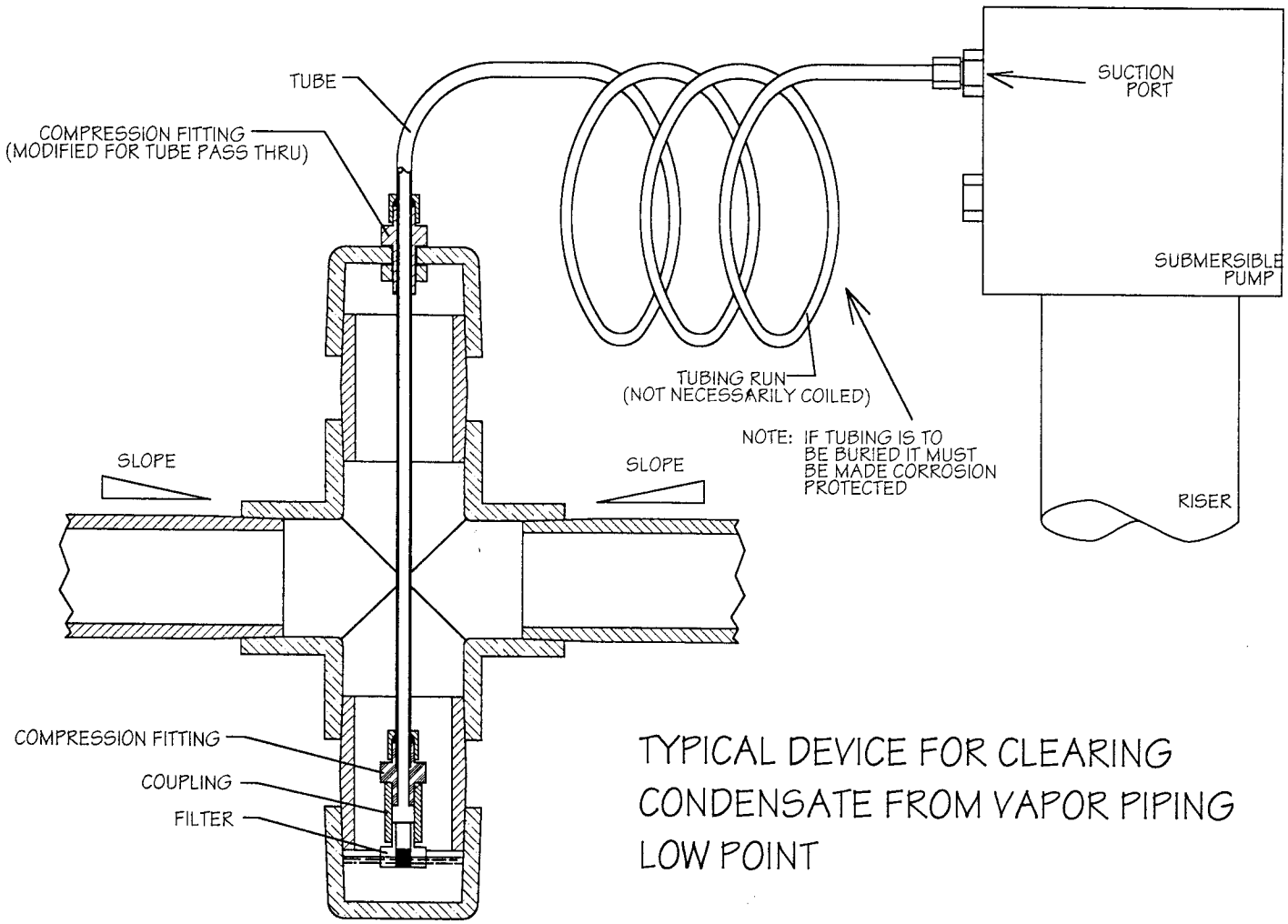
Figure 2A-5
Automatic Low Point Liquid Clearing Device (Typical)



TYPICAL DEVICE FOR CLEARING
CONDENSATE FROM VAPOR PIPING
LOW POINT

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Figure 2B-1
Processing Unit

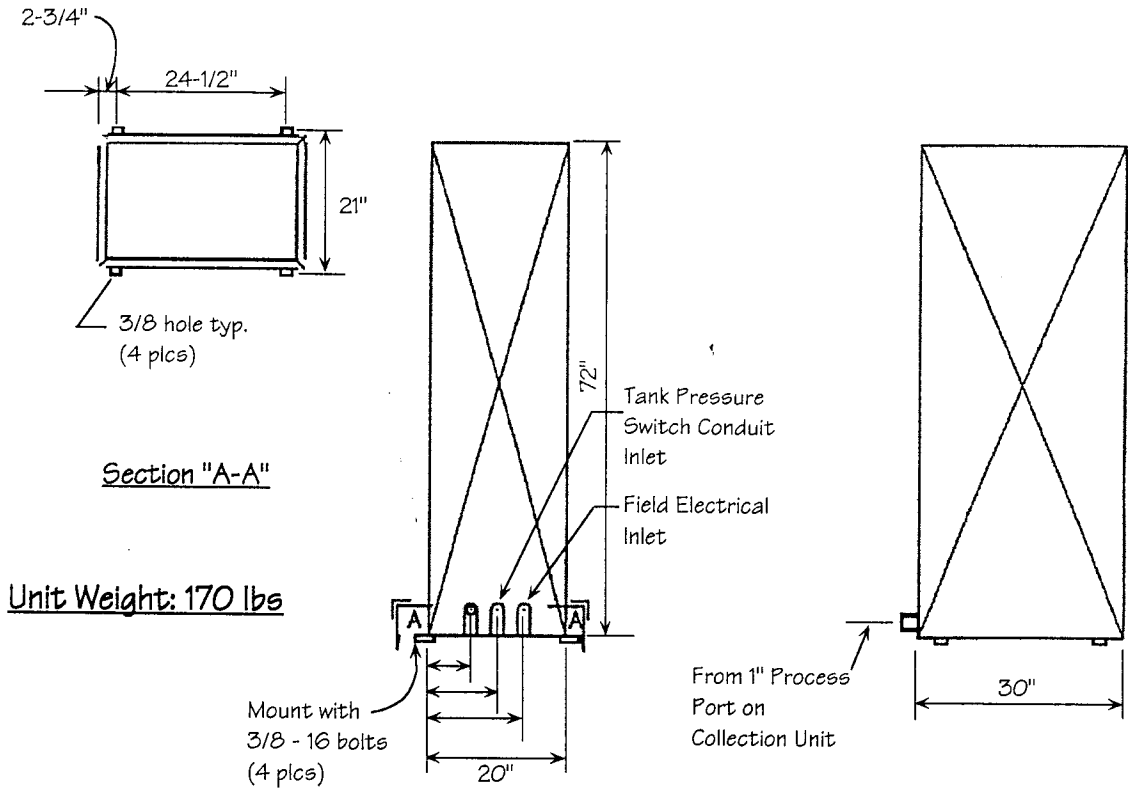

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Figure 2B-2
Collection Unit Detail

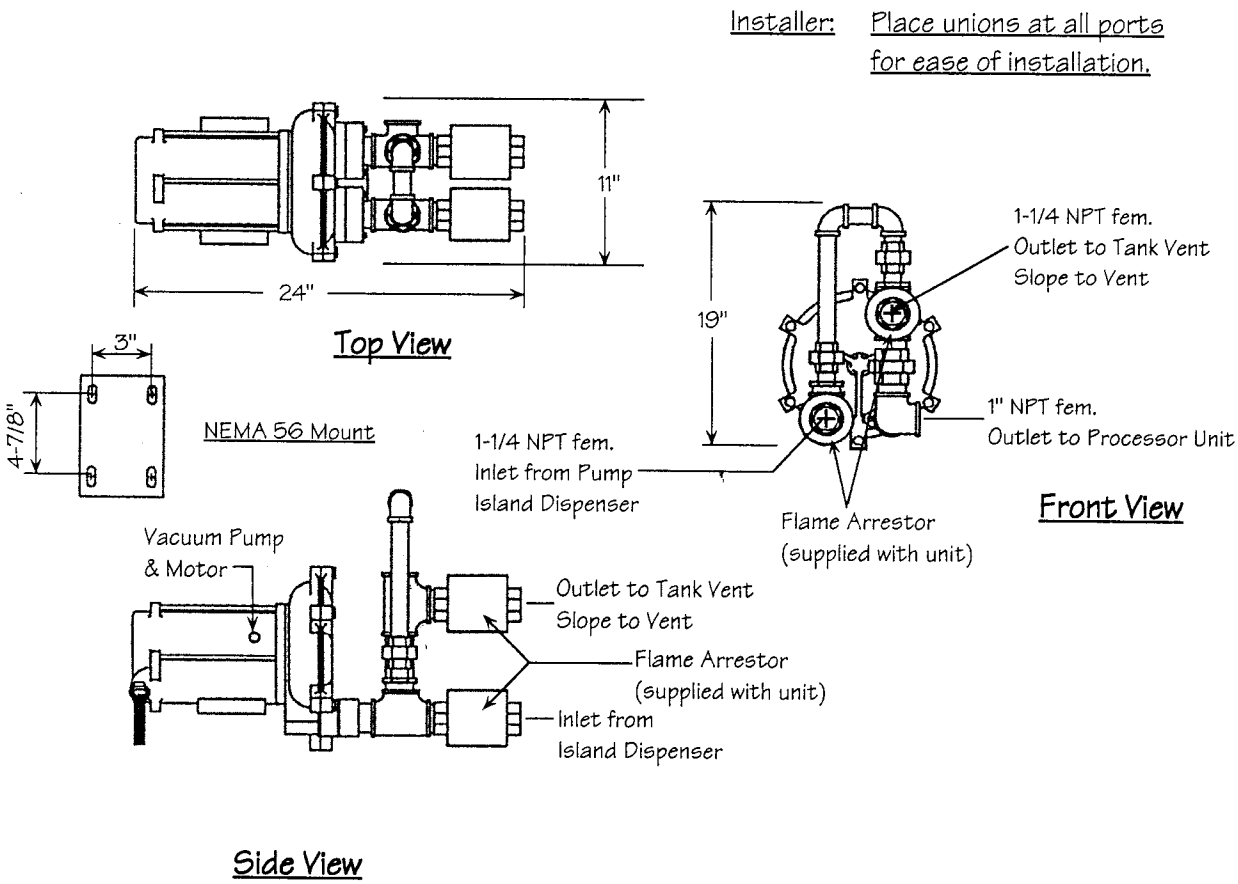

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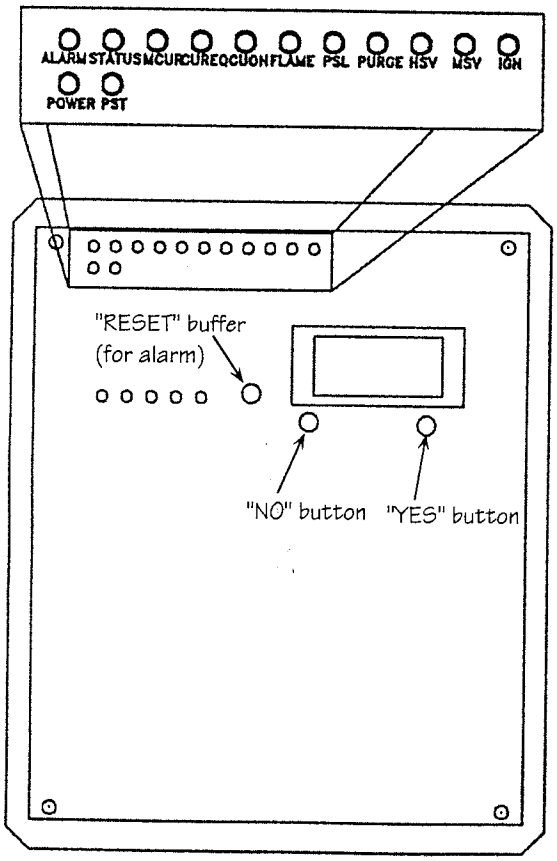
Figure 2B-3
Control Panel



Key to LEDs:

ALARM =>Alarm Condition
CUON =>Collection Unit Active
CUREQ =>Dispenser Active
FLAME =>Processing Vapors
HSV =>High Volume Processing
IGN =>Initiate Processing
MCUR =>Collection Unit Sensor
MSV => Main Processor Valve Open
POWER =>Panel Power
PSL =>Processor Pressure
PST =>Tank Ullage Pressure
PURGE =>Clearing Lines
STATUS =>Not Used

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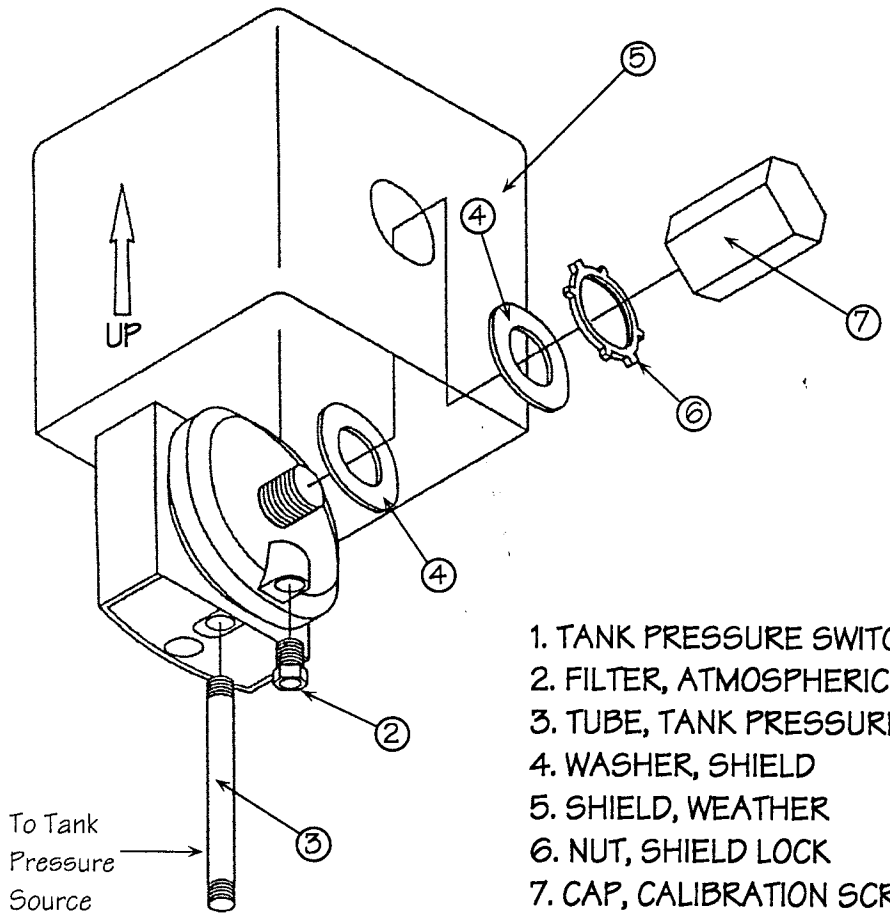
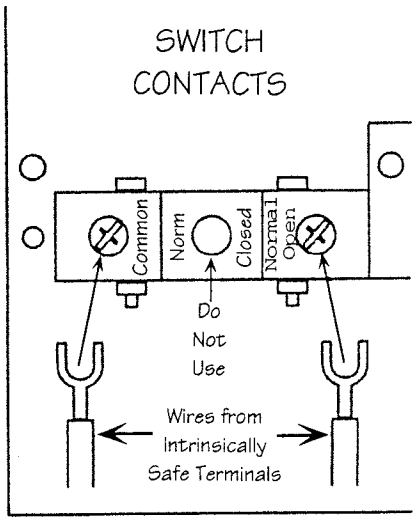
Figure 2B-4
Tank Pressure Switch





SWITCH
ELECTRICAL
CONNECTIONS

1. TANK PRESSURE SWITCH
2. FILTER, ATMOSPHERIC
3. TUBE, TANK PRESSURE
4. WASHER, SHIELD
5. SHIELD, WEATHER
6. NUT, SHIELD LOCK
7. CAP, CALIBRATION SCREW

ORIENTATE AS SHOWN

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Figure 2B-5
Standard Installation

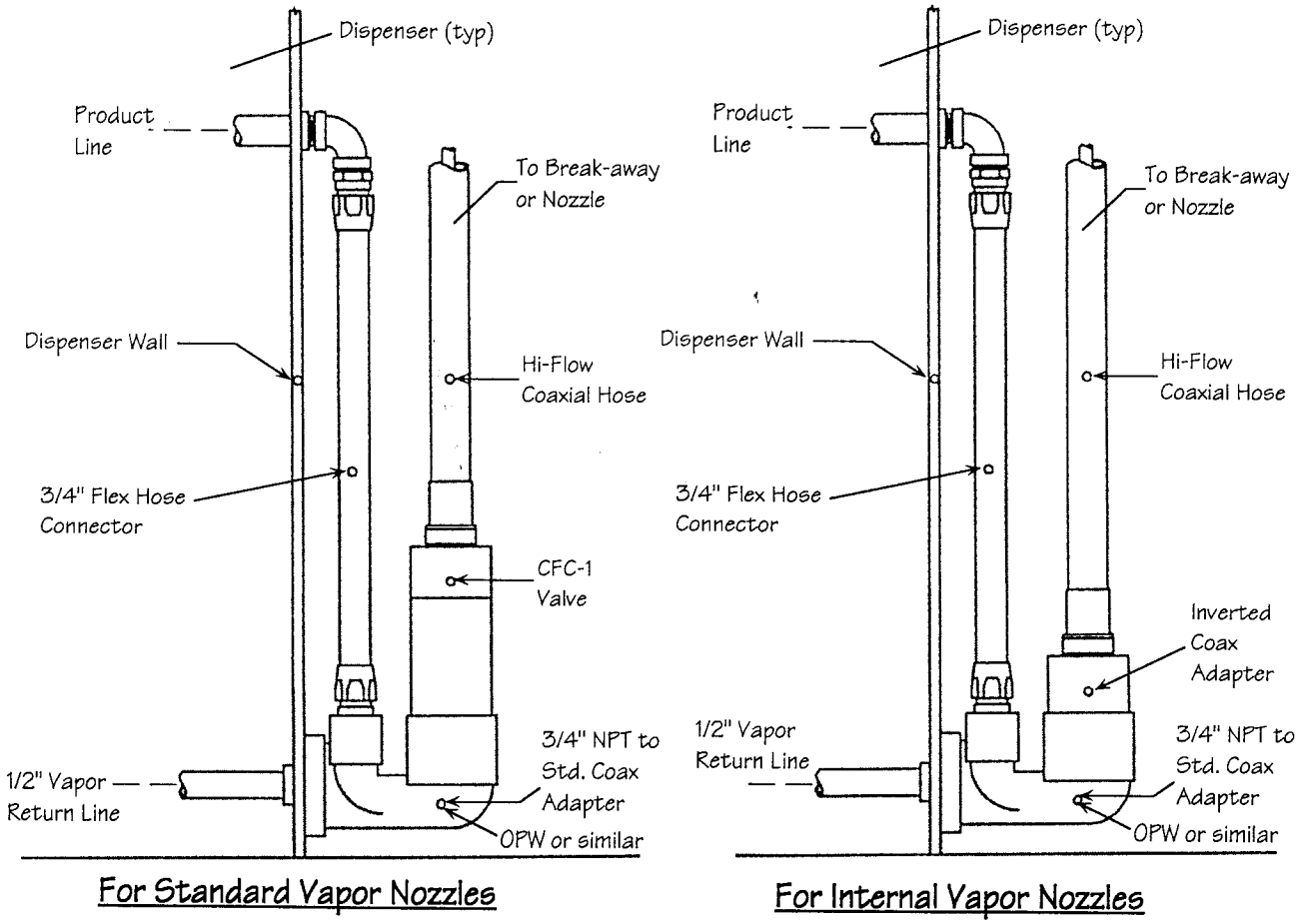

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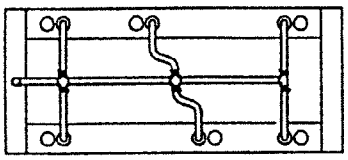
Figure 2B-6
Multi-Product Dispenser Installation



Vapor Plumbing Layout (typ)

Note:
Only Vapor Lines Shown for Clarity

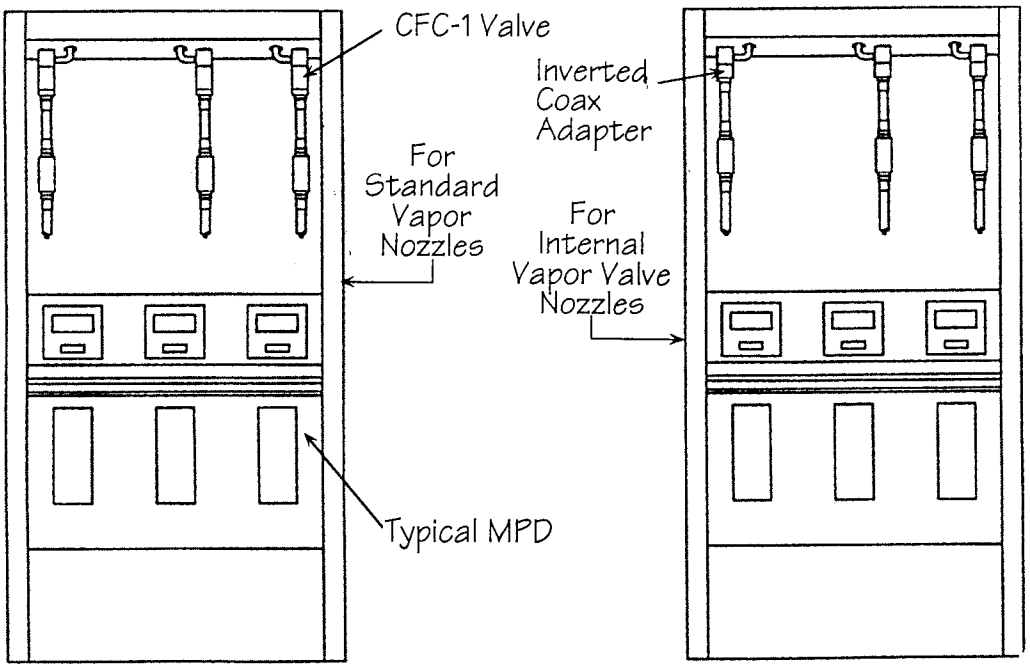


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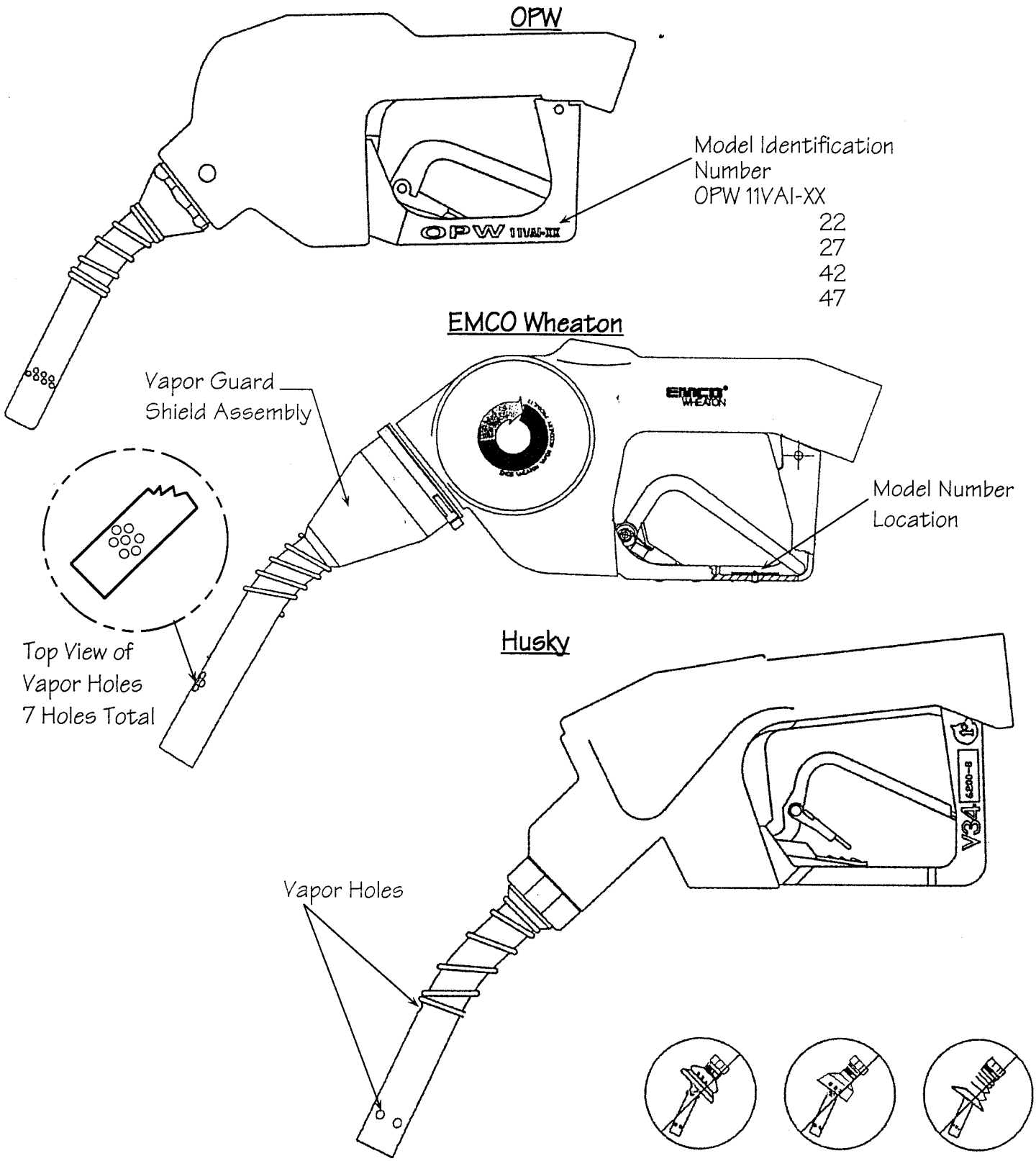
Figure 2C
OPW 11VAI Nozzle, Emco Wheaton A4500 Nozzle and the Husky V34 6200-8 Nozzle



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Hasstech VCP-3A Phase II Vapor Recovery System for Aboveground Tank Vapor Recovery Systems

Exhibit 3

STATIC PRESSURE INTEGRITY TEST ABOVEGROUND STORAGE TANKS

APPLICABILITY

This test procedure is used to quantify the vapor tightness of any aboveground storage tank installed at a gasoline dispensing facility (GDF). Leaks in a balance Phase II system may cause excessive vapor emissions. Leaks in a vacuum assist Phase II system may decrease the efficiency of the vapor collection and/or processing system.

PRINCIPLE AND SUMMARY OF TEST PROCEDURE

Nitrogen is introduced via the vent pipe until the entire vapor recovery system is pressurized to two (2.0) inches water column. The pressure is then allowed to decay for five (5) minutes. The acceptability of the final pressure is based upon the vapor system ullage. Single wall storage tanks at bulk plants may already be pressurized during daylight hours due to diurnal heating. This test may not be used in this instance and vapor tightness will be determined by checking for leaks with a TLV sniffer (or other hydrocarbon detector), a liquid bubble solution (such as "Snoop"), and/or other techniques.

BIASES AND INTERFERENCES

For vaulted aboveground tanks equipped with vacuum-assist Phase II systems, the processor must be isolated and the vapor system capped. Leakage at these points will indicate a system component leak.

SENSITIVITY, RANGE AND PRECISION

1. Sensitivity

   a. **Inclined Liquid Manometers and Electronic Pressure Meters**

      Maximum incremental graduations at, above, and below a pressure observation shall be 0.01 inches water column ("WC).

      The maximum bias shall be plus-or-minus one-half percent (±0.5%) of full-scale.

   b. **Mechanical Spring Diaphragm Pressure Gauges**

      The minimum diameter of the pressure gauge face shall be 4 inches.

      Maximum incremental graduations at, above, and below a pressure observation shall be 0.05 "WC.

      Each such graduation shall be defined as the resolution, P_{Res}, of a pressure observation.

      The maximum bias shall be plus-or-minus two percent (±2%) of full-scale.

2. **Range**

a. **Pressure**

The pressure range in Table 1 is 0.16 to 1.93 inches water column ("WC).

b. **Volume Flow**

The minimum and maximum nitrogen feed-rates, into the system, shall be one (1) and five (5) CFM, respectively.

3. **Precision**

The precision of a pressure observation shall affect the compliance status of a system as described below, where:

$P_{req@t}$ ≡ pressure requirement, at a specified time, per the appropriate certification procedure, rounded to the nearest integral multiple of P_{Res},

and

$P_{obs@t}$ ≡ pressure observation, at the specified time.

The precision for a pressure observation shall be one-half of P_{Res}.

$P_{obs@t}$ shall be an integral multiple of P_{Res}.

Non-Compliance with a pressure requirement shall be determined when, at a specified volume flow:

$$P_{Req@t} - P_{Obs@t} \geq P_{Res}.$$

EQUIPMENT

1. **Pressure Meters**

At least two types of pressure meters can meet the precision specifications:

a. inclined liquid manometers; and

b. electronic meters using pressure transducers.

2. **Nitrogen**

Use commercial grade nitrogen in a high pressure cylinder, equipped with a two-stage pressure regulator and a one psig pressure relief valve.

3. **Vent Pipe Pressure Assembly**

See Figure 1 for example.

4. **Stopwatch**

Use a stopwatch accurate and precise to within 0.2 seconds.

CALIBRATION PROCEDURE

Follow manufacturers instructions.

PRE-TEST PROTOCOL

1. Dispensing shall not take place during the test. There shall have been no bulk deliveries to the storage tanks within the three hours prior to the test.

2. Measure the gasoline volume in each aboveground storage tank and determine the actual capacity of each storage tank. Calculate the ullage space for each tank by subtracting the gasoline volume present from the actual tank capacity. The minimum ullage during the test shall be 25 percent of the tank capacity or 300 gallons, whichever is greater. If applicable, the vent pipes may be manifolded during the test to achieve the required ullage.

3. For two-point Phase I systems this test shall be conducted with the dust cap removed from the vapor coupler. This is necessary to insure the vapor tightness of the vapor poppet.

4. For coaxial Phase I systems this test shall be conducted with the dust cap removed from the Phase I coupler. This is necessary to insure the vapor tightness of the vapor poppet.

   a. If the Phase I containment box is equipped with a drain valve, the valve assembly may be cleaned and lubricated prior to the test. This test shall, however, be conducted with the drain valve assembly installed.

   b. Carefully remove the vent pipe pressure/vacuum valve. Install the vent pipe pressure assembly (see Figure 1).

TEST PROCEDURE

This test procedure is based on direct measurements only; no sampling, recovery, or analysis is involved.

1. Open the nitrogen gas supply valve, regulate the delivery pressure to at least 5 psig, and pressurize the vapor system (or subsystem for individual vapor return line systems) to or slightly above 2 inches water column. It is critical to maintain the nitrogen flow until both flow and pressure stabilize, indicating temperature and vapor pressure stabilization in the tanks. Close the nitrogen supply valve.

2. Check the vent pipe pressure assembly using leak detecting solution to verify that the test equipment is leak tight.

3. Re-open the nitrogen supply valve, and reset the tank pressure to reestablish a pressure slightly greater than 2 inches water column. Close the nitrogen supply valve and start the stopwatch when the pressure reaches an initial pressure of 2.0 inches of water column.

4. At one-minute intervals during the test, record the system pressure. After five minutes, record the final system pressure. See Equation 11.1 or Table 1 to determine the acceptability of the final system pressure results.

5. If the system failed to meet the criteria set forth in Table 1, re-pressurize the system and check all accessible vapor connections using leak detector solution or a combustible gas detector. If vapor leaks in the system are encountered, repair or replace the defective component and repeat the test.

6. If the compartments in the vaulted tanks are not manifolded, repeat the test for each of the compartments, using the appropriate vent pipe.

   Carefully remove the vent pipe pressure assembly. Allow any remaining pressure to be relieved through vent pipe(s) to minimize exposure to benzene. Keep all potential ignition sources away from the vent pipe(s). Carefully reinstall the pressure/vacuum relief valve.

   Use Equation 11.1 or Table 1 to determine the compliance status of the facility by comparing the final five minute pressure with the minimum allowable pressure.

Minimum Allowable Pressure

The minimum allowable pressure after five (5) minutes, with an initial pressure of 2.0 inches H_2O, shall be calculated as shown below, or obtained from Table 1:

$$P_2 = 2e^{(-760.490/Vu)}$$

Where:

P_2	=	The minimum pressure after 5 minutes, inches H_2O
V_u	=	The ullage of the system, gallons
e	=	Constant equal to 2.71828
2	=	The initial starting pressure, inches H_2O
-760.490	=	Decay constant for a 5 minute test

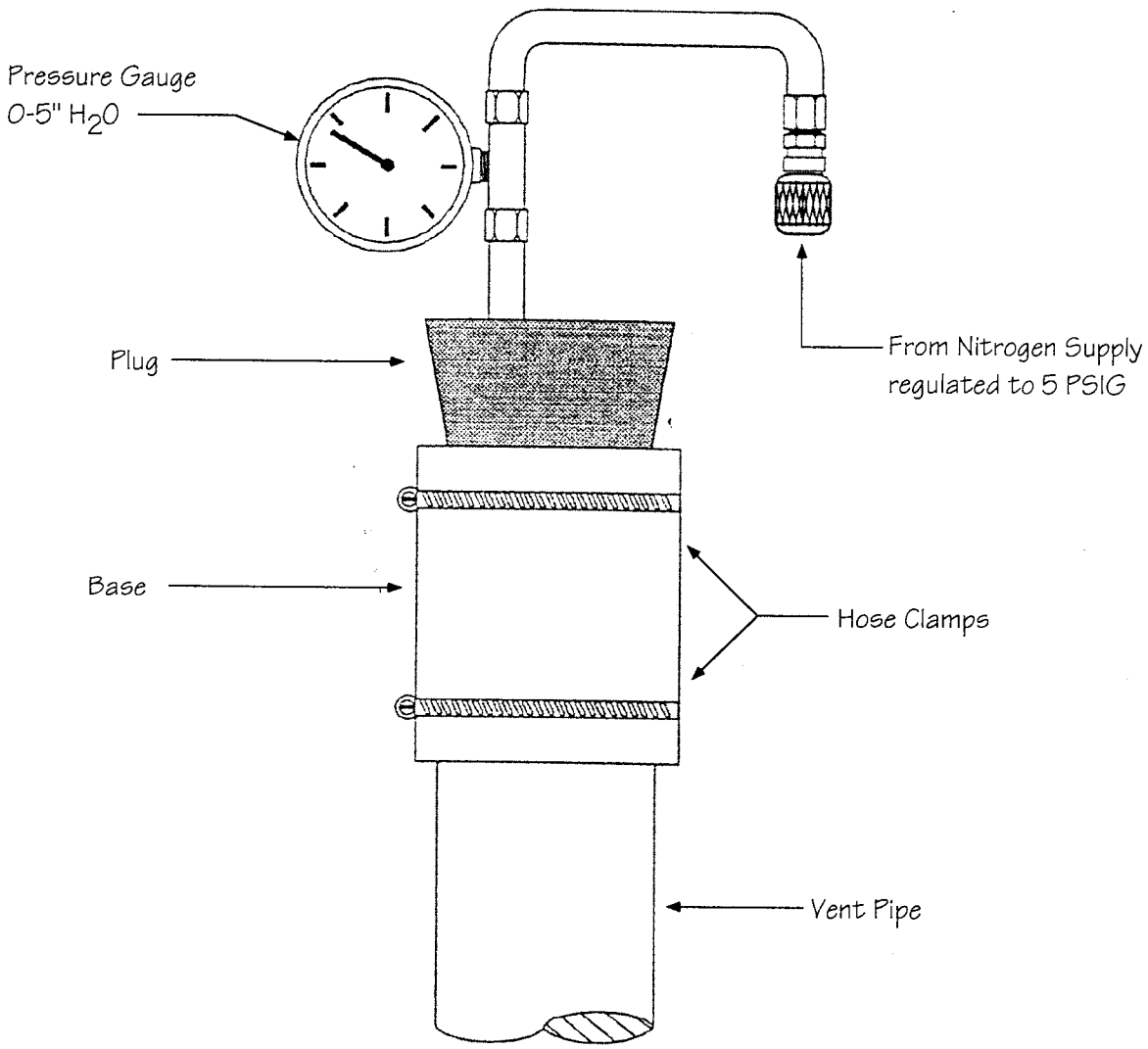
TABLE 1
Leak Rate Criteria

ULLAGE (GALLONS)	MINIMUM PRESSURE AFTER 5 MINUTES, (INCHES OF H_2O)	ULLAGE (GALLONS)	MINIMUM PRESSURE AFTER 5 MINUTES, (INCHES OF H_2O)
300	**0.16**	**1,800**	**1.31**
350	0.23	2,000	1.37
400	**0.30**	**2,200**	**1.42**
450	0.37	2,400	1.46
500	**0.44**	**2,600**	**1.49**
550	0.50	2,800	1.52
600	**0.56**	**3,000**	**1.55**
650	0.62	3,500	1.61
700	**0.67**	**4,000**	**1.65**
750	0.73	4,500	1.69
800	**0.77**	**5,000**	**1.72**
850	0.82	6,000	1.76
900	**0.86**	**7,000**	**1.79**
950	0.90	8,000	1.82
1,000	**0.93**	**9,000**	**1.84**
1,200	1.06	10,000	1.85
1,400	**1.16**	**15,000**	**1.90**
1,600	1.24	20,000	1.93

REPORTING RESULTS

The calculated ullage and system pressures for each five minute vapor recovery system test shall be reported as shown in Form 1. Be sure to include the Phase II system type, whether the system is manifolded, and the one-minute pressures during the test.

Figure 1
Vent Pipe Pressure Assembly



Form I
Summary of Source Test Data

SOURCE INFORMATION		FACILITY PARAMETERS
GDF Name and Address _____ _____ _____	GDF Representative and Title GDF Phone No. ( )	PHASE II SYSTEM TYPE (Check One) Balance ____ Hirt ____ Red Jacket ____ Hasstech ____ Healy ____ Other ____
Permit Conditions	Source: GDF Vapor Recovery System GDF# _____ A/C # _____	Manifolded? Y or N

Operating Parameters

Number of Nozzels Served by Tank #1 _____ Number of Nozzels Served by Tank #3 _____

Number of Nozzels Served by Tank #2 _____ Number of Nozzels Served by Tank #4 _____

Applicable Regulations:	VN Recommended:

Source Test Results and Comments

TANK #:	1	2	3	4
1. Product Grade				
2. Actual Tank Capacity, gallons				
3. Gasoline Volume				
4. Ullage, gallons (#2-#3)				
5. Initial Pressure, inches H_2O				
6. Pressure After 1 Minute, inches H_2O				
7. Final Pressure After 2 Minutes, inches H_2O				
8. Allowable Final Pressure				

Test Conducted by:	Test Company:	Date of Test: